Salpichroa origanifolia as weed of container plants in Fuerteventura?

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Recently the dispersal of alien species by the trade with container plants was demonstrated by random sampling in Northern Italy and also in Northern Germany. By this new way of dispersal especially thermophilous weeds from America like *Acalypha virginica, Chamaesyce maculata, Chamaesyce nutans, Chamaesyce prostrata, Commelina communis, Conyza bonariensis, Conyza sumatrensis, Gnaphalium pensylvanicum, Lepidium didymum, Oxalis corniculata, Solanum chenopodioides* and *Veronica peregrina* are introduced besides Mediterranean species like *Parietaria judaica* (BRANDES 2018). Some years ago we found strong evidences for dispersing *Salpichroa origanifolia* by the same way in Fuerteventura.

Fig. 1: *Salpichroa origanifolia* climbing on a trunk of *Phoenix dactylifera* (Costa Calma, Fuerteventura, spring 2004).

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The species

Salpichroa origanifolia is a member of the family of Solanaceae. The species is a multibranched herb, sometimes scrambling , with simply leaves, whose shape remember *Origanum vulgare*. The whitish corolla is urceolate with 5 deflexed lobes. The fruit is a creamy-white berry, ca. 10-15 mm long.

The fruit is comestible and is used for production of confitures in Argentina and Paraguay (COUPLAN 2015). Withanolids (e.g. Salpichrolide B) isolated from *Salpichroa origanifolia* produce lethal and sublethal effects on the larvae of the Mediterranean fruit fly *Ceratitis capitata* (BADO et al. 2004). Therefore the contents of *Salpichroa origanifolia* are possibly of interest for pest control.

Origin, distribution and ecology

The origin of *Salpichroa origanifolia* is eastern South America. It is locally naturalized in Southwest and South Europe: Flora Europaea lists the species for Azores, Portugal, Spain, France, Corse, Italy and Britain (TUTIN et al. 2010). In Spain the species is not only documented for the mainland but also for Tenerife, Gran Canaria and Fuerteventura (ARECHAVALETA, M., S. RODRÍGUEZ, N. ZURITA & A. GARCÍA 2010; SCHÖNFELDER & SCHÖNFELDER 2012). In France it is distributed at Corsica, along the Mediterranean Sea and also along the Atlantic coast northwards till Normandy (MANCEAU 2015). Salpichroa origanifolia is naturalized in Italy in most regions except Sardinia, the plain of the Po and most parts of the Alps (MICHELUCCI 2009). In the Alps it is however till now only found in the Piedmontese Alps (provinces Novara incl. Verbania)(AESCHIMANN et al. 2004).

The most comprehensive compilation of ecological indicator values and biological attributes of the species is given by LANDOLT et al. (2010). The climate indicators are: T 4,5 (temperature: warm-collin), K 3 (continentality: suboceanic to subcontinental), L 3 (light: semi-shade). The soil indicators are: F 1,5 (moisture: dry), W 1(moisture little varying), R 3 (weakly acid to weakly neural), N 3 (medium infertile to medium fertile), H 3: (moderate humus content), D 3 (moderate aeration). *Salpichroa origanifolia* is classified as woody chamaephyte and as C-R-S strategist. According to LANDOLT et al. (2010) the dispersal occurs only by endochory, vegetative dispersal is not mentioned. Observations from New Zealand are contrarily: It seems that the seeds of *Salpichroa origanifolia* contribute nothing to the dispersal of the species but the rhizomes enable rejuvenation and marginal spread (Esler 1988). Seed longevity is estimated for 1 to 5 years (LANDOLT et al. 2010). Habitats are ruderal and semi-ruderal places, rocks and walls, as well as shrubberies, hedges and forest edges. Therefore the species is classified as moderately hemerobic (moderately urbanophilous).

SCHÖNFELDER & SCHÖNFELDER (20D08) mention *Salpichroa origanifolia* also for Tunisia, Algeria and Morocco.

Salpichroa origanifolia was introduced to California as weed of disturbed places with a high risk of becoming invasive (calflora: Salpichroa origanifolia [2017]). It is listed also as invasive species in Japan. The range of distribution is central to western Honshu Island. Urban areas and harbours are mentioned as habitats, astonishingly this species is believed to be a garden escape from botanical gardens (Invasive species of Japan [2018]).

Salpichroa orgianifolia is often found in moist areas in New South Wales (CHU & DEBRINCAT 2010) and is naturalized also in New Zealand (ESLER 1988).

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Salpichroa origanifolia **on Fuerteventura**

Irrigation supports alien weeds in Mediterranean summer dry or arid regions: BERGMEIER (2008) investigated irrigated garden croplands in Cretan villages and showed that the proportion of alien species established in these gardens was higher than in all other known plant communities in Crete. The first record of *Salpichroa origanifolia* originates from 1988 from Jardines de Ezquinzo (S. SCHOLZ in SANTOS GUERRA 1996). Some years ago we studied the weedy vegetation around the stems of watered trees (e.g. *Phoenix canariensis, Casuarina equisetifolia, Schinus terebinthifolius* and *Olea europaea* in Fuerteventura (BRANDES 2015). The main result was that alien weeds are supported by irrigation. Among some 100 weeds we found also *Salpichroa origanifolia* only growing in less shaded areas around young trees. Sometimes we observed climbing individuals at the trunks of watered trees.

Table 1 shows the species combination of watered areas around the trunks. We neither found colonization of not-watered sandy soil nor growing of *Salpichroa origanifolia* in shaded places of older plantations. But which are the possible vectors for dispersal of our species? Own observations and observations from New Zealand (ESLER 1988: "*Salpichroa origanifolia* and *Ipomoea indica* have occasional seeds with seemingly contribute nothing to the dispersal of the species") lead to the hypothesis, that *Salpichroa origanifolia* will be distributed as a container weed. Vectors of dispersal are the whole plant or rhizomes, which are planted out together with the young trees. The *Salpichroa origanifolia* profile of the California Invasive Plant Council (Cal-IPC) lists spreading via seeds, and also via root fragments and pieces of underground stems.

Fig. 2: Detail of *Salpichroa origanifolia* (Costa Calma, Fuerteventura, 2005-2-19).

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Table 1: *Salpichroa origanifolia* community

Number of the relevé	1794	1787	1788	1789	1792	1793	1795	1797	1798	1799	1796
Area [m²]	2	4	4	4	3	4	6	20	2	4	5
Vegetation cover [%]	65	80	90	90	80	80	80	85	90	100	95
Species number	4	6	7	8	5	7	8	15	9	10	8
Alien species:											
Salpichroa origanifolia	3.3	3.2	4.3	4.4	4.4	3.3	4.4	3.4	3.4	4.4	4.4
Bidens pilosa	1.2	1.2	1.2	+	.	+	.	3.2	.	.	.
Conyza sumatrensis	.	+.2	.	.	.	.	.	+	.	.	.
Amaranthus viridis	.	.	1.2	1.2	.	.	.	.	.	.	.
Parietaria judaica	.	.	.	1.1	.	.	.	.	.	.	.
Atriplex semibaccata	.	.	.	.	.	.	..	2.1	.	.	.
Further species of Stellarietea:											
Patellifolia patellaris	1°.2	1.2	1.2	1.1	1°.1	.	2°.2	+	1.1	1.2	.
Setaria adhaerens	.	2.2	1.2	2.2	2.2	2.3	.	3.2	.	.	.
Solanum nigrum	.	.	1.2	+	+	.	.	.	1.1	3.3	.
Chenopodium murale	.	.	.	.	.	+	.	2.2	1.2	+	.
Sonchus oleraceus	.	.	+.2	.	.	.	.	1.2	.	+	.
Mesmbryanthemum nodiflorum	.	.	.	.	+	.	.	+	.	.	.
Launaea nudicaulis	.	.	.	.	.	.	1.2	.	.	1.2	.
Reichardia tingitana	.	.	.	.	.	.	+	.	+	.	.
Sonchus tenerrimus	.	.	.	.	.	.	.	1.2	1.2	.	.
Mesembryanthemum crystallinum	.	.	.	.	.	.	.	.	.	2.2	1.1
Stipa capensis	.	.	.	.	.	.	+.2	.	.	.	.
Hordeum murinum	.	.	.	.	.	.	.	1.2	.	.	.
Lotus glinoides	.	.	.	.	.	.	.	1.2	.	.	.
Senecio coronopifolius	.	.	.	.	.	.	.	.	.	.	1.2
Species of the natural vegetation:											
Heliotropium ramosissimum	.	1.2	.	.	.	2.2	1.2	+		+	2.2
Cenchrus ciliaris	.	.	.	.	.	1.2	.	1.2	2.2	.	1.2
Launaea arborescens juv.	.	.	.	.	.	+	.	1.1	2.1	1.1	+
Salsola divaricata juv.	1.1	.	.	.	.	.	+	.	.	1.1	1.1
Atriplex glauca ssp. ifniensis	.	.	.	+	.	.	1.2	.	.	.	.
Cuscuta planiflora	.	.	.	.	.	.	.	.	+.2	.	.
Plantago afra	.	.	.	.	.	.	.	.	.	.	R

All relevés are made in spring 2004.

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Fig. 3: Planting the central reservation of a road in Barcelona: the importance of container plants (2017-11-8).

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